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tendency in all branches of natural history; and the writer deplors it. Is it not just as well to call these chief groups orders with as little disturbance as possible to existing plans of classification? For, after all, it seems to be merely a question of names. However, classification of organisms is an art that passes understanding, and no one knows where it will end; possibly when all the species have been raised to genera and all the genera to families, and families to orders, etc.

Perhaps the most widely useful part of the work is reserved for the conclusion of this review—the introductory chapter. In this the author brings together in a readable way the underlying principles of paleontology, with especial reference to mammals, but also widely applicable, not only to all branches of paleontology, but to all natural history as well. The philosophy of structure, correlation, range, environment, the laws of evolution as applying to mammals in general and in detail, are among the subjects treated. Not all is discussed that might have been; not all the conclusions are beyond controversy, but, withal, it is the best summary of the guiding principles of paleontological research the writer has seen.

The writer can not recommend the work as one suitable to slip into one's grip for literary recreation on a vacation outing—it is a little heavy and forbidding in places. As a work of reference for the geologist and naturalist it is indispensable; and it will be a working tool for the student of extinct mammals. Perhaps, with the publication of this work there will no longer be an excuse for the further display of the dense ignorance concerning extinct forms that characterizes the most of our text-books in zoology—at least let us hope so!

In conclusion it may be said that this inventory of extinct mammals has been well done; the way is again cleared for a further rapid expansion in our knowledge of this class of vertebrates. And the author is to be commended and congratulated on the opportunities he has aided in opening up.

S. W. WILLISTON

Catalogue of the Nearctic Hemiptera-Heteroptera. By NATHAN BANKS. Philadelphia, Pa., American Entomological Society. 1910.

This catalogue covers the entire group of Heteroptera for the Arctic region, and in this respect is of much greater service to the American student than the general catalogue of Kirkaldy which includes only a few of the families represented in this region. The work is rather a presentation of the existing knowledge than an attempt to rearrange the grouping or to introduce radical changes in the generally accepted nomenclature. The list covers 1,268 species and is particularly serviceable in certain families which have not been treated in recent years. Such a catalogue has been much needed, as the only work of a similar character, the list by Dr. Uhler, published over twenty years ago, is long since out of date. The paper shows some defects in proof reading, as for instance, the misspelling of *Macrovelia* and *Zicrona*, but on the whole it seems to be quite free from serious error. We can certainly share with the author the hope "that this catalogue will encourage entomologists to devote more time to this order, so that our forms will be better known to us."

HERBERT OSBORN

The Relation between Chemical Constitution and some Physical Properties. By SAMUEL SMILES, D.Sc., New York, Longmans, Green and Co. 1910.

The study of the relations between the chemical constitution and the physical properties of substances has interested chemists and physicists for a greater period of time than has the study of any other branch of chemistry which possesses more or less general interest at present. For this reason, the volume under review should exert a wider appeal than any which have appeared in the series of "Text-books of Physical Chemistry" edited by Sir William Ramsay, of which it forms a part. As part of a physical chemistry series it will appeal to physical and inorganic chemists, and it will also appeal to organic chemists, since as stated by Professor Smiles

in the preface, it has been written "from the standpoint of organic chemistry."

The subject matter is discussed under the following headings: Mechanical Properties, under which are treated Capillarity, Viscosity and Volume Relations; Thermal Properties, including Specific Heat, Fusibility and Boiling Point; Optical Properties, including Refractive and Dispersive Power, Absorption of Light, Fluorescence and Magnetic Rotatory Power; and Electric Property, including a short chapter on Anomalous Electric Absorption.

In an introductory chapter, the development of the study of the physical properties is traced and the gradual increase in importance of these properties as aids in determining chemical constitution is clearly brought out. The concluding statement of this chapter that in determining chemical constitution "evidence drawn from physical properties should be regarded as subordinate to chemical evidence" will be concurred in by most chemists. In the sections dealing with the Mechanical and Thermal Properties, an unsatisfactory impression is obtained at times with regard to the scope of the theoretical treatment as well as the application to the experimental data. On the other hand, in fairness to the author, it must be said that with the space at his disposal a more satisfactory treatment of these subjects is scarcely possible. The same criticism does not apply to the chapters in which the optical properties are discussed, as here the treatment is clear and complete, especially in describing the relations which have been deduced between absorption and chemical constitution. The additive and constitutive effects exerted by the atoms and groups of a molecule upon each property are carefully distinguished throughout and illustrated by concrete examples.

The concluding chapter considers the present status of the subject and the most fruitful lines for further investigations. In the opinion of the author, the study of the optical properties, including absorption and refraction, offer the greatest promise, but further advance along these lines depends upon a sat-

isfactory theory of valence. This, it is pointed out, is the most important problem awaiting solution from the chemist, and "the electronic theory seems to be the only means by which there is any prospect of attaining further knowledge of the nature of valence."

K. G. FALK

Chemische Krystallographie. By P. von GROTH. Leipzig, Wilhelm Engelmann. 1910. Vol. 3. Pp. iv+804, 648 figures; 8vo, cloth, 30 Marks. (Volume IV. is in preparation.)

In 1904 Professor P. von Groth, of the University of Munich, published his "Einleitung zur Chemischen Krystallographie," and followed it two years later with the first volume. In 1908 the second volume of the "Chemische Krystallographie" was issued. These volumes have all been reviewed in SCIENCE.¹

Groth's "Chemische Krystallographie" is a work of monumental proportions, and is to include the crystallographic data of all substances which have been described at the time of the publication of the individual volumes. Inorganic compounds were discussed in volumes I. and II. The third and fourth volumes are to be devoted to organic compounds. In volume III., which has just been published, crystallographic data are given for the aliphatic carbon compounds, hydrobenzol derivatives and terpenes. The method of treatment in this volume is the same as in the others, according to which all substances having a similar chemical composition are placed together and their descriptions prefaced by a discussion of the work done on the group. These discussions are suggestive as well as critical in character and make the work of much more value than a mere compilation of chemical crystallographic data could be. This volume, as well as volume IV., which it is hoped will be published before long, ought to prove of especial value to organic chemists.

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¹ Vol. XXV., 143-144; Vol. XXVIII., 843.